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The Status of the Witch Flounder Stock in Subdivision 3Ps

by

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Abstract

Catches from this stock have generally been about 1000 tons annually since 1979. Biomass has been estimated from surveys since 1976 and have generally been between 3000 tons and 6000 tons during the 1980s with no identifiable trend. In February 1993, biomass was estimated at 2000 tons compared to 3000 tons in April 1993. Ages ranged as high as 22 years old in the mid-1970s but was reduced to a maximum of 14 years old by 1980. Age distribution has remained relatively stable since that time.

Résumé

Les prises annuelles en provenance de ce stock ont été de l'ordre de 1 000 t depuis 1979. La biomasse, fondée sur des relevés de recherche depuis 1976, s'est généralement située entre 3 000 et 6 000 tonnes dans les années 1980 et ne semblait pas suivre une tendance discernable. On l'estimait à 2 000 t en février 1993 et à 3 000 t en avril 1993. La fourchette d'âges allait jusqu'à 22 ans au milieu des années 1970; en 1980, elle était tombée à un maximum de 14 ans. La distribution des âges est restée relativement stable depuis lors.

Description of the Fishery

The catches of witch flounder in NAFO Subdivision 3Ps were about 1000 tons annually during the 1960s. Catches then increased to over 4000 tons in 1967-69, then declined slowly to former levels in the late 1970s. During the last 10 years, catches have ranged from as low as 300 tons in 1983 to as high as 1300 tons in 1986 (Fig. 1). However, with a TAC of 1000 tons in place since 1988, the average catch since 1989 has been about equal to the TAC. During the 1980s, the catch was primarily a by-catch of other groundfish fisheries; however, in recent years with the severe declines in major groundfish resources (flatfish species in particular) certain sectors of the fishing industry have become much more dependent on stocks such as these. This is especially true when catch rates are economically viable and market prices and demands are high.

Catches from this stock have been taken mainly by Canadian trawlers fishing offshore on St. Pierre Bank while there are some catches taken by small Scottish seiners and gillnetters fishing in Fortune Bay off the southcoast of Newfoundland. There are also some catches taken by French fishermen off St. Pierre and Miquelon although these catches usually account for small amounts.

Biological Surveys

Stratified-random research vessel surveys have been conducted by Canada in wintertime on St. Pierre Bank since the early 1970s; however, only since about 1976 has coverage been relatively complete, at least to a depth of 300 fathoms. The results of these surveys for witch flounder are presented in Tables 1 and 2. Biomass estimates have been highly variable over the past 15 years or so, fluctuating between 2000 and 6000 tons showing little in the way of trends. It has been suggested in the past that the reason for this is that the main depths where witch flounder are not surveyed by the research vessels. While two recent surveys in 1993 are within the range of past biomass estimates, it is known that a quite successful fishery occurred in deep water beyond the range of the surveys which would lend support to this hypothesis. On the other hand, it is also true that the fishery concentrates within a relatively small area on a prespawning concentration of probably high density. While commercial catch rates may appear quite viable in a small area, it is necessary to be cautious and not misinterpret as a real indication of a healthy stock.

When survey indices are plotted by depth zone (Fig. 2), it can be observed that during the late 1970s and early 1980s there were considerable levels of the existing biomass in depths less than 100 fathoms whereas during the 1980s there were none.

Catch at Age

Abundance estimates at age from research vessel surveys are presented in Table 3. In the mid-1970s, ages ranged as high as 22 years old; however, this was reduced to a maximum of 14 years old by 1980. The age structure has remained relatively stable since that time to the present although the abundance indices have shown considerable variation on an annual basis as indicated earlier.

Conclusion

Long-term prospects for this stock are uncertain. The 1993 fishery was considered highly successful; however, it was prosecuted on a very densely aggregated pre-spawning concentration and may not be representative of stock abundance.

Table 1. Witch - average weight (kg) per 30 minute set - NAFO Subdivision 3Ps. (No. of sets shown in parentheses.)

Stratum	ATC 247,248 1976	ATC 261 1977	ATC 273,275 1978	ATC 287 1979	ATC 302 1980	ATC 316 1981	ATC 330 1982	AN 9 1983	AN 26 1984	WT 26 1985	WT 45 1986	WT 55,56 1987	WT 68 1988	WT 81 1989	WT 91 1990	WT 103 1991	WT 118 1992	WT 113 1993
306	1.10(6)	3.21(6)	1.49(9)	2.63(5)	1.72(2)	2.43(3)	0.70(3)	3.30(4)	0.15(2)	1.75(2)	2.78(3)	1.05(4)	0.43(4)	1.23(3)	0.00(3)	0.21(4)	0.05(2)	0.22(4)
307	0.34(4)	2.21(4)	0.03(7)	0.0(4)	0.45(2)	0.0(3)	0.0(4)	0.38(4)	1.00(2)	0.33(3)	0.27(3)	0.0(3)	0.00(4)	0.00(2)	0.00(3)	0.00(3)	0.00(2)	0.00(4)
308	0.0(2)	0.0(4)	0.0(2)	0.0(4)	0.0(2)	0.0(2)	0.0(2)	0.0(3)	0.00(2)	0.00(2)	0.0(2)	0.0(2)	0.50(2)	0.00(2)	0.00(2)	0.00(2)	0.00(2)	0.00(2)
309	1.91(7)	6.14(6)	3.38(9)	3.97(6)	0.0(2)	3.75(2)	0.0(2)	3.00(3)	1.95(2)	4.67(3)	2.50(2)	0.15(2)	0.37(3)	1.00(2)	0.71(2)	0.91(3)	0.12(2)	0.37(3)
310	2.84(4)	6.94(6)	6.63(9)	4.01(6)	4.09(2)	6.00(2)	4.00(3)	1.67(3)	3.25(2)	5.67(3)	7.00(2)	1.60(2)	1.43(3)	4.75(2)	3.45(2)	0.25(3)	0.03(2)	1.33(2)
311	9.91(6)	24.29(4)	1.25(8)	1.47(4)	0.22(2)	0.25(2)	0.0(3)	0.0(3)	3.00(2)	0.55(4)	23.00(3)	0.17(3)	1.53(4)	0.07(3)	0.00(3)	0.05(3)	0.00(2)	0.10(3)
312	0.09(5)	0.91(4)	0.0(2)	0.0(3)	-	0.0(2)	0.35(2)	0.0(3)	0.50(2)	0.00(2)	0.0(2)	0.0(2)	0.00(2)	0.00(3)	0.00(3)	0.00(2)	0.00(2)	0.00(2)
313	9.88(6)	8.32(10)	17.07(5)	6.17(5)	22.24(2)	25.00(2)	8.50(2)	10.17(3)	2.50(2)	3.85(2)	3.75(2)	1.25(2)	6.25(2)	8.65(2)	16.14(2)	1.01(2)	6.22(2)	1.60(2)
314	0.0(2)	0.28(4)	0.0(3)	-	0.0(2)	0.0(5)	0.0(5)	0.0(7)	0.00(4)	0.00(7)	0.0(8)	0.0(5)	0.00(7)	0.00(9)	0.00(6)	0.00(7)	0.00(5)	0.00(6)
315	0.0(2)	0.34(4)	-	0.0(3)	0.0(4)	0.0(2)	0.40(3)	1.20(8)	2.20(5)	0.00(7)	0.75(6)	0.0(8)	0.50(6)	0.36(7)	0.00(2)	0.00(7)	0.00(7)	0.00(5)
316	5.45(4)	33.33(6)	15.17(6)	18.76(3)	5.90(2)	16.50(2)	-	41.00(4)	30.50(2)	37.17(3)	35.50(2)	33.33(3)	87.00(3)	31.82(3)	51.40(2)	0.69(2)	59.68(2)	-
317	39.50(4)	11.55(4)	6.98(4)	0.0(3)	4.43(2)	0.15(2)	5.17(3)	98.33(3)	119.75(2)	2.00(2)	4.00(2)	0.17(3)	3.25(2)	0.00(2)	0.00(2)	0.00(2)	1.17(2)	0.00(2)
318	1.91(7)	6.05(6)	5.90(2)	14.74(2)	7.26(2)	-	0.95(2)	10.07(3)	0.95(2)	-	59.50(2)	2.13(2)	23.45(2)	1.50(2)	-	71.28(2)	0.40(2)	3.53(2)
319	1.25(4)	1.59(6)	1.82(4)	0.91(2)	18.84(4)	16.50(2)	0.93(7)	1.00(7)	2.08(6)	0.75(2)	2.38(8)	2.11(9)	1.05(8)	13.28(8)	-	0.12(9)	0.00(10)	0.00(9)
320	0.15(3)	-	-	-	0.0(6)	0.0(2)	0.0(4)	0.86(14)	0.00(8)	0.00(5)	0.0(9)	0.0(11)	0.00(11)	0.00(10)	0.00(5)	0.00(12)	0.00(9)	0.00(5)
321	0.68(2)	-	0.0(3)	-	0.0(5)	0.0(2)	0.0(4)	0.0(10)	0.00(6)	0.00(7)	0.0(10)	0.0(10)	0.00(11)	0.00(9)	0.00(8)	0.00(11)	0.00(9)	0.00(6)
322	0.0(4)	-	0.0(2)	0.0(2)	0.77(8)	0.0(2)	0.31(8)	0.18(11)	0.44(8)	0.00(13)	0.09(12)	0.0(10)	0.02(12)	0.00(14)	0.00(16)	0.00(14)	0.00(8)	0.00(12)
323	0.0(4)	93.36(2)	0.15(3)	-	0.0(3)	3.75(2)	1.00(2)	9.50(6)	0.38(4)	4.33(3)	0.14(5)	1.87(6)	0.28(5)	0.64(7)	0.00(4)	0.00(6)	0.00(6)	0.00(7)
324	0.0(2)	-	-	0.0(2)	0.0(2)	-	0.0(2)	0.0(4)	0.00(3)	0.00(2)	0.0(5)	0.00(4)	0.00(4)	0.00(5)	0.00(5)	0.00(4)	0.00(5)	0.00(3)
325	0.0(2)	-	0.0(2)	0.0(2)	0.0(4)	0.0(2)	0.0(5)	0.00(8)	0.18(5)	0.00(3)	0.00(8)	0.0(6)	0.00(6)	0.00(8)	0.00(2)	0.00(9)	0.00(10)	0.00(9)
326	-	-	0.0(2)	0.0(2)	0.0(2)	0.0(2)	0.0(2)	0.0(3)	0.00(2)	-	0.0(2)	0.0(2)	0.00(2)	0.00(2)	0.00(2)	0.00(2)	0.00(2)	0.00(2)
705	6.02(4)	7.15(4)	3.99(5)	13.39(4)	7.94(2)	12.50(2)	-	4.93(3)	3.75(2)	6.60(2)	7.00(2)	7.00(2)	18.00(2)	9.49(2)	3.85(2)	10.93(2)	7.10(2)	2.28(2)
706	8.55(3)	20.56(4)	8.63(2)	24.64(3)	9.99(2)	17.75(2)	2.40(4)	11.30(5)	8.50(2)	6.07(4)	12.63(4)	15.75(5)	10.38(4)	4.62(4)	9.66(4)	19.71(4)	13.19(5)	7.83(3)
707	3.29(6)	1.29(4)	10.90(2)	11.13(2)	9.53(2)	-	-	6.10(3)	5.75(2)	-	10.50(2)	13.50(2)	4.25(2)	9.93(7)	-	126.91(2)	37.58(2)	15.05(2)
708	13.77(3)	6.23(4)	-	4.31(2)	0.80(2)	-	-	2.75(2)	3.57(2)	-	7.50(2)	8.00(2)	3.75(2)	12.49(2)	-	119.50(2)	8.31(2)	11.60(2)
709	3.29(2)	-	-	-	-	-	-	0.15(2)	0.20(2)	-	-	-	-	6.50(2)	-	17.40(2)	-	4.97(2)
710	-	-	-	-	-	-	-	1.79(3)	1.50(2)	1.00(2)	3.00(2)	-	0.75(2)	-	-	2.47(2)	-	2.56(2)
711	12.49(2)	-	-	-	4.77(2)	7.30(2)	2.95(2)	5.49(8)	4.40(5)	4.89(8)	8.28(9)	5.71(7)	4.01(7)	5.64(7)	4.98(3)	5.07(8)	13.28(10)	3.95(5)
712	2.73(2)	-	-	8.39(2)	6.13(2)	10.25(2)	1.30(3)	3.73(7)	-	7.02(6)	7.50(9)	3.50(4)	4.86(7)	3.37(8)	2.83(5)	6.12(8)	10.53(10)	4.02(7)
713	-	-	-	-	4.31(2)	2.67(6)	1.20(2)	2.48(7)	-	2.99(8)	5.60(5)	9.63(4)	4.13(7)	4.40(8)	3.90(7)	7.42(8)	7.82(10)	5.91(8)
714	2.39(2)	-	4.20(2)	-	4.54(2)	5.70(8)	1.32(6)	1.31(10)	-	-	11.90(5)	4.38(4)	7.61(9)	5.40(10)	5.40(7)	8.22(11)	6.99(7)	2.65(11)
715	3.81(5)	2.67(4)	9.08(6)	4.69(3)	3.29(2)	2.35(2)	1.50(2)	6.33(3)	2.25(2)	-	5.50(2)	5.00(2)	4.25(2)	11.24(2)	1.65(2)	0.00(2)	1.58(2)	0.50(2)
716	4.09(2)	8.32(6)	4.47(6)	8.11(4)	3.63(2)	11.25(4)	1.50(2)	5.00(4)	4.47(3)	7.44(5)	16.57(4)	10.20(3)	11.14(5)	10.62(4)	10.43(5)	5.08(5)	6.87(3)	5.08(4)
Biomass (t) (area surveyed)	3396	8090	2052	2983	4330	5475	1124	4955	3738	2835	6223	3863	4594	4256	3159	5937	5064	2098
Biomass (t) (adjusted to total area by MM)	3605	11534	2865	4044	4353	5640	1199	4965	4801	3222	6226	3892	4599	4259	3396			

Table 2. Biomass (tons) by stratum of witch flounder in NAFO Subdivision 3Ps from 1976-93.

Depth (fath)	Str.	Area	Units ('000)	Year 1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993 Feb	1993 April
0-30	314	974	73	0	20	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
	320	1320	99	15	-	-	-	0	0	0	85	0	0	0	0	0	0	0	0	0	0	0
31-50	308	112	8	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0
	312	272	20	2	19	0	0	-	0	7	0	10	0	0	0	0	0	0	0	0	0	0
	315	827	62	0	21	-	0	0	0	25	74	137	0	47	0	31	22	0	0	0	0	0
	321	1189	89	61	-	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	325	944	71	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0
	326	166	12	-	-	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0
51-100	307	395	30	10	66	1	0	13	0	0	11	30	10	8	0	0	0	0	0	0	0	2
	311	317	24	236	578	30	35	5	6	0	0	71	13	547	4	36	2	0	1	0	2	0
	317	193	14	572	167	101	0	64	2	75	1425	1735	29	58	2	47	0	0	0	17	0	11
	319	984	74	92	117	134	67	1392	1219	69	74	154	55	176	156	78	981	-	9	0	0	0
	322	1567	118	0	-	0	0	91	0	36	21	52	0	11	0	2	0	0	0	0	0	0
	323	696	52	0	4878	8	-	0	196	52	496	20	226	7	98	15	33	0	0	0	0	0
	324	494	37	0	-	-	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0
101-150	306	419	31	35	101	47	83	54	76	22	104	5	55	87	33	14	39	0	7	2	7	2
	309	296	22	42	136	75	88	0	83	0	67	43	104	56	3	8	22	16	20	3	8	41
	310	170	13	36	89	85	51	52	77	51	21	41	72	89	20	18	61	44	3	0	17	1
	313	165	12	122	103	211	76	275	310	105	126	31	48	46	15	77	107	200	13	77	20	165
	316	189	14	77	473	215	266	84	234	-	582	433	527	504	473	1234	451	729	10	847	-	656
	318	123	9	18	56	54	136	67	-	9	93	9	-	549	20	217	14	-	658	4	33	548
151-200	705	195	15	88	105	58	196	116	183	-	72	55	97	102	102	263	139	56	160	104	33	63
	706	476	36	305	735	308	880	357	634	86	404	304	217	451	563	371	165	345	704	471	280	518
	707	93	7	23	9	76	78	67	-	-	43	40	-	73	94	30	69	-	886	262	105	118
	715	132	10	38	26	90	46	33	23	15	63	22	-	54	50	42	111	16	0	16	5	42
	716	539	40	165	337	181	328	147	455	61	202	181	301	670	413	451	430	422	206	278	206	142
201-300	708	117	9	121	55	-	38	7	-	-	24	31	-	66	70	33	110	-	1050	73	102	26
	711	961	72	901	-	-	-	344	527	213	396	317	353	597	412	289	407	359	366	958	285	340
	712	973	73	199	-	-	613	448	749	95	272	-	513	548	256	355	246	207	447	769	294	133
	713	950	71	0	-	-	-	307	190	86	177	-	213	399	687	295	314	278	529	558	421	147
	714	1195	90	214	-	377	-	407	511	118	118	-	-	1067	393	683	484	484	737	627	238	205
301-400	709	96	7	24	-	-	-	-	-	-	1	1	-	-	-	-	47	-	125	-	36	21
	710	36	3	0	-	-	-	-	-	-	5	4	3	8	-	2	-	-	7	-	7	-
Total				3398	8090	2052	2982	4330	5475	1124	4956	3739	2836	6223	3864	4595	4254	3157	5937	5065	2098	3189
0-30				15	20	0	0	0	0	0	85	0	0	0	0	0	0	0	0	0	0	9
31-50				63	40	0	0	0	0	32	74	160	0	47	0	35	22	0	0	0	0	0
51-100				910	5806	274	102	1565	1423	232	2027	2061	333	807	260	178	1016	0	10	17	2	12
101-150				331	958	688	701	532	780	187	992	562	806	1332	565	1568	694	989	710	932	85	1412
151-200				620	1211	714	1529	719	1296	161	784	602	615	1352	1222	1157	914	840	1956	1131	629	883
201-300				1436	55	377	651	1513	1977	512	987	349	1079	2678	1817	1654	1561	1328	3129	2985	1340	851
301-400				24	0	0	0	0	0	0	6	5	3	8	0	2	47	0	132	0	43	21

Table 3. Abundance estimates (000's) of witch flounder from research vessel surveys in Div. 3Ps.

Age	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
1																	18
2	36	4	-	6	116	41	-	18	-	22	-	-	-	-	-	56	14
3	192	22	-	27	324	676	39	33	14	16	-	18	33	4	-	120	139
4	445	13	89	116	241	775	477	186	32	85	139	40	74	129	56	100	234
5	373	108	158	141	499	613	845	697	153	278	572	222	293	266	132	272	271
6	1298	56	144	149	922	1219	659	1255	562	1472	2957	1049	799	729	421	1037	1406
7	725	238	194	752	2101	3338	527	2294	1401	1947	4198	2282	4376	1964	2074	3258	4901
8	942	478	340	1355	1728	3590	629	2556	2112	1640	3184	2178	3866	2933	2263	4600	5340
9	2194	776	535	1342	1125	2421	779	2902	2446	878	1920	1616	2092	1775	796	3188	3405
10	2271	1675	803	1520	1111	2190	620	2193	2348	810	1722	1379	1172	1491	530	2050	1386
11	2184	2174	973	1290	1330	1743	268	1213	962	553	970	1056	997	1210	445	1659	1199
12	1380	2964	807	784	983	675	292	248	325	562	311	610	431	855	269	1100	304
13	748	1845	599	293	461	46	212	23	86	191	88	128	87	293	134	430	284
14	337	1577	483	138	78	9	11		18	16	9	-	18	92	87	70	11
15	242	1000	203	18	-	-	-	-	-	-	-	-	-	-	-	9	-
16	245	508	127	10	-	-	-	-	-	-	-	-	-	-	-	-	-
17	55	409	52	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	93	254	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	28	120	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	35	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	13847	14275	5538	7941	11019	17336	5358	13618	10459	8470	16070	10581	14238	11741	7211	17950	18915

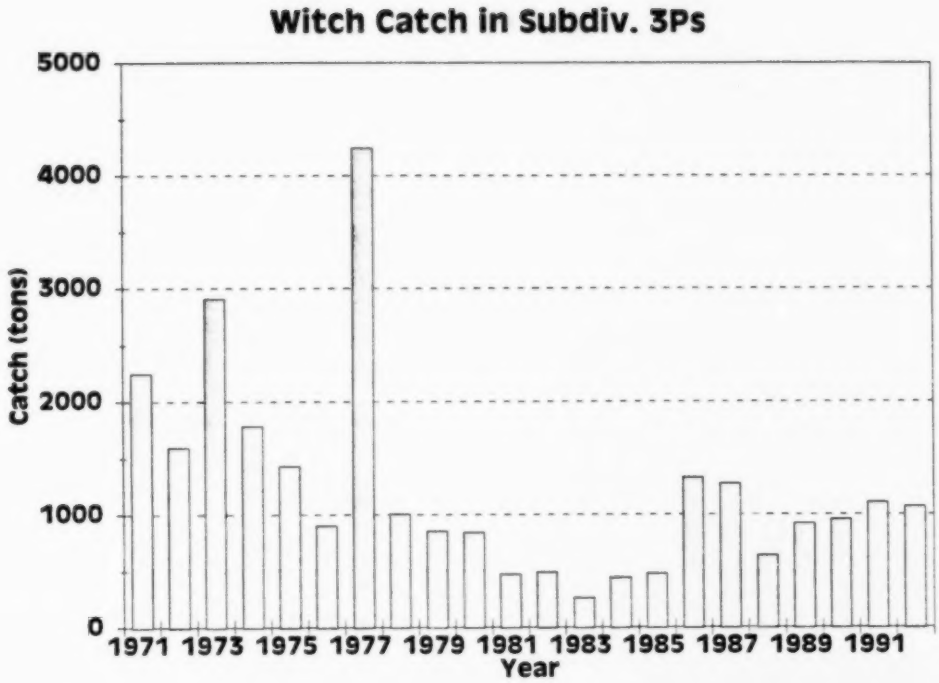

Fig. 1. Commercial catches of witch flounder in Subdiv. 3Ps from 1971-92.

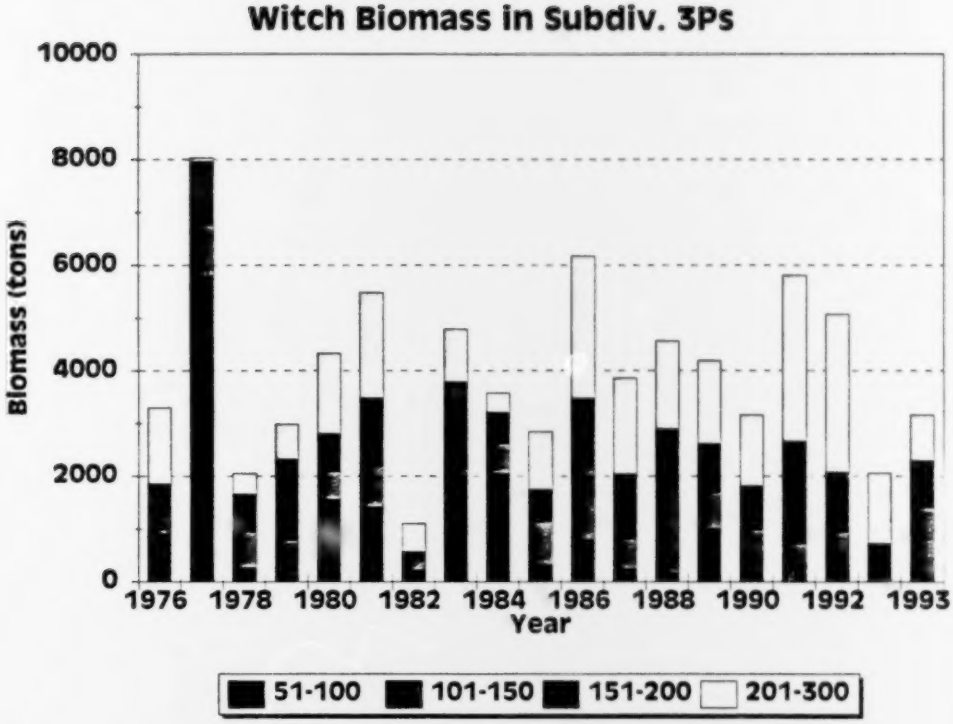

Fig.2. Biomass of witch flounder by depth range in Subdiv. 3Ps from research vessel surveys during 1976-93.